Agilent HLMP-CWxx
T-1 3/4 Precision Optical Performance White LED Lamps
Data Sheet

HLMP-CW15, HLMP-CW16, HLMP-CW23, HLMP-CW24, HLMP-CW30, HLMP-CW31

Description

These high intensity white LED lamps are based on InGaN material technology. A blue LED die is coated by a phosphor to produce white. The typical resulting color is described by the coordinates x = 0.32, y = 0.32 using the 1931 CIE Chromaticity Diagram.

These T-1¾ lamps are untinted, nondiffused, and incorporate precise optics producing well defined spatial radiation patterns at specific viewing cone angle.

Features

- Highly luminous white emission
- 15°, 23°, and 30° viewing angle

Applications

- Electronic signs and signals
- Small area illumination
- Legend backlighting
- General purpose indicators

Benefit

- Reduced power consumption, higher reliability, and increased optical / mechanical design flexibility compared to incandescent bulbs and other alternative white light sources

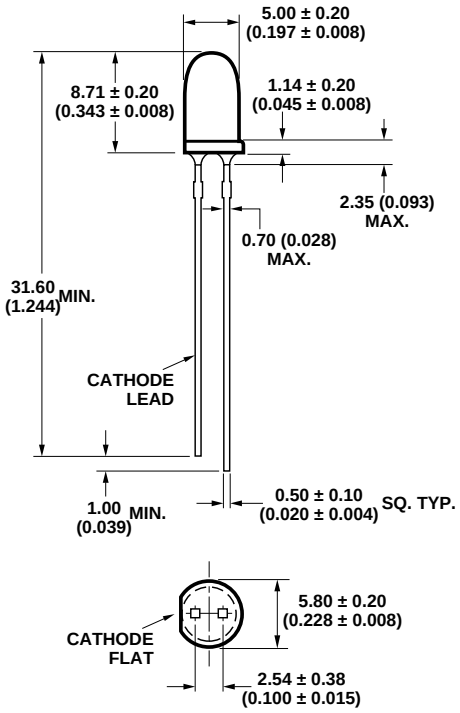
CAUTION: *These devices are Class 2 ESD sensitive. Please observe appropriate precautions during handling and processing. Refer to Agilent Technologies Application Note AN-1142 for additional details.*

Device Selection Guide

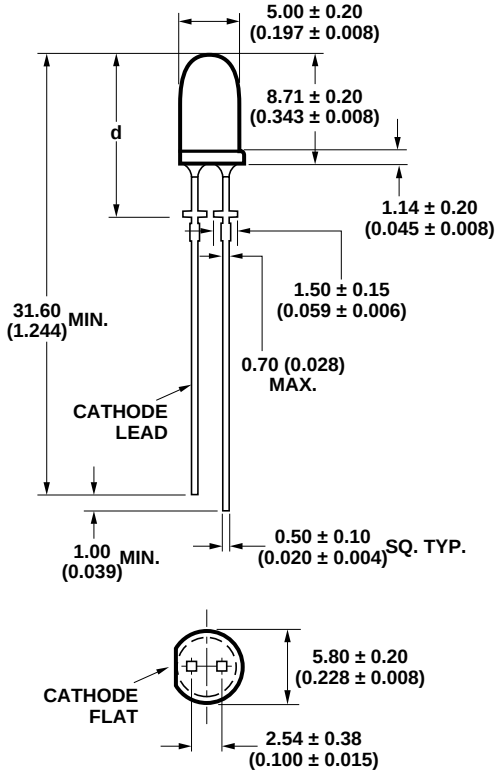
Part Number	Viewing Angle Typ.	Min. Luminous Intensity Iv (mcd) @ 20 mA Min.	Max.	Standoff Leads	Package Dimension
HLMP-CW15-TW0xx	15°	2500	7200	No	A
HLMP-CW15-VY0xx	15°	4200	12000	No	A
HLMP-CW16-TW0xx	15°	2500	7200	Yes	B
HLMP-CW16-VY0xx	15°	4200	12000	Yes	B
HLMP-CW23-SV0xx	23°	1900	5500	No	A
HLMP-CW23-TW0xx	23°	2500	7200	No	A
HLMP-CW24-SV0xx	23°	1900	5500	Yes	B
HLMP-CW24-TW0xx	23°	2500	7200	Yes	B
HLMP-CW30-PS0xx	30°	880	2500	No	A
HLMP-CW30-SV0xx	30°	1900	5500	No	A
HLMP-CW31-PS0xx	30°	880	2500	Yes	B
HLMP-CW31-SV0xx	30°	1900	5500	Yes	B

Tolerance for each intensity limit is ± 15%.

Package Dimensions



PACKAGE DIMENSION A



PACKAGE DIMENSION B

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS (INCHES).
2. EPOXY MENISCUS MAY EXTEND ABOUT 1 mm (0.040") DOWN THE LEADS.

HLMP-CW16	HLMP-CW24	HLMP-CW31
d = 12.6 ± 0.25 (0.496 ± 0.010)	d = 12.52 ± 0.25 (0.493 ± 0.010)	d = 11.96 ± 0.25 (0.471 ± 0.010)

Part Numbering System

HLMP – CW<u>xx</u> - <u>x</u> <u>x</u> <u>x</u> <u>xx</u>

Mechanical Option
00: Bulk
DD: Ammo Pack

Color Bin Option
0: Full color bin distribution

Maximum Intensity Bin Limit
0: No maximum intensity bin limit

Minimum Intensity Bin Limit
Refer to Device Selection Guide

Viewing Angle and Standoff Option
15: 15° without standoffs
16: 15° with standoffs
23: 23° without standoffs
24: 23° with standoffs
30: 30° without standoffs
31: 30° with standoffs

Absolute Maximum Ratings

T_A = 25°C

Parameter	Value	Units
DC Forward Current[1]	30	mA
Peak Forward Current[2]	100	mA
Power Dissipation	120	mW
Reverse Voltage (I_R = 10 μA)	5	V
LED Junction Temperature	110	°C
Operating Temperature Range	–40 to +80	°C
Storage Temperature Range	–40 to +100	°C

Notes:

1. Derate linearly as shown in Figure 5.
2. Duty factor 10%, 1 kHz.

Electrical Characteristics

T_A = 25°C

Forward Voltage, V_F (V) @ I_F = 20 mA		Reverse Breakdown, V_R (V) @ I_R = 10 μA	Capacitance, C (pF), V_F = 0, f = 1 MHz	Thermal Resistance $Rq_{J\text{-}PIN}$ (°C/W)
Typ.	Max.	Min.	Typ.	Typ.
3.6	4.0	5	70	240

Optical Characteristics

T_A = 25°C

Part Number	Typical Chromaticity Coordinates[1] X	Y	Viewing Angle $2\theta_{1/2}$ Degrees[2] Typ.
HLMP-CW3x-xxxxx	0.32	0.32	30
HLMP-CW2x-xxxxx	0.32	0.32	23
HLMP-CW1x-xxxxx	0.32	0.32	15

Notes:

1. The chromaticity coordinates are derived from the CIE 1931 Chromaticity Diagram and represent the perceived color of the device.
2. $\theta_{1/2}$ is the off-axis angle where the luminous intensity is ½ the peak intensity.

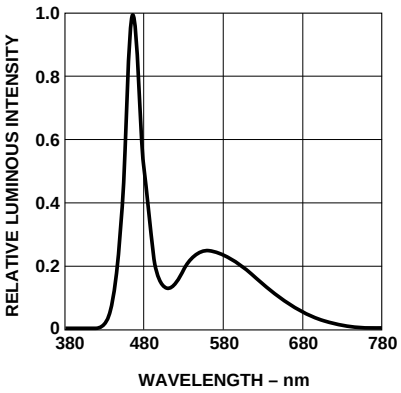


Figure 1. Relative intensity vs. wavelength.

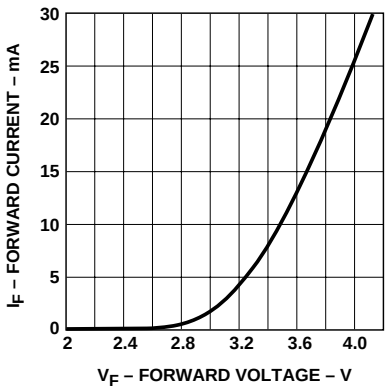


Figure 2. Forward current vs. forward voltage.

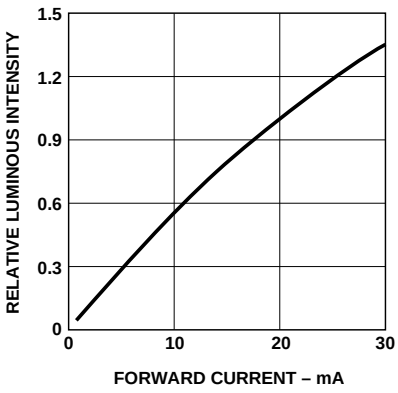


Figure 3. Relative Iv vs. forward current.

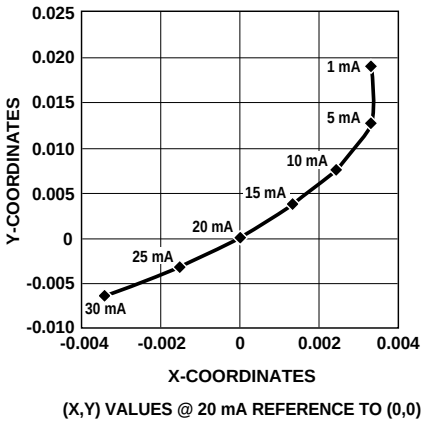


Figure 4. Chromaticity shift vs. current.

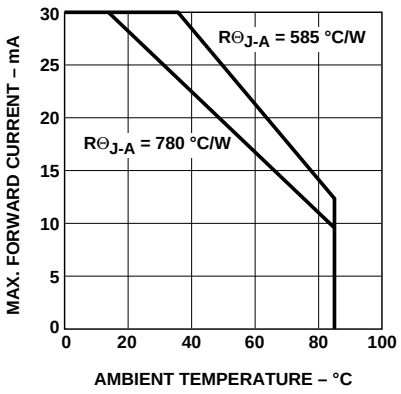


Figure 5. Maximum forward current vs. temperature.

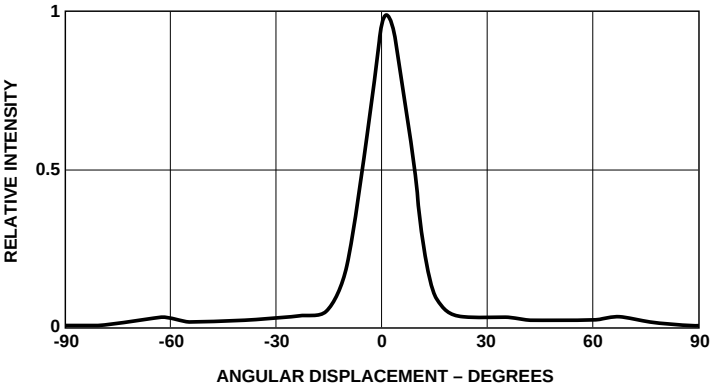


Figure 6a. CW1x spatial radiation pattern.

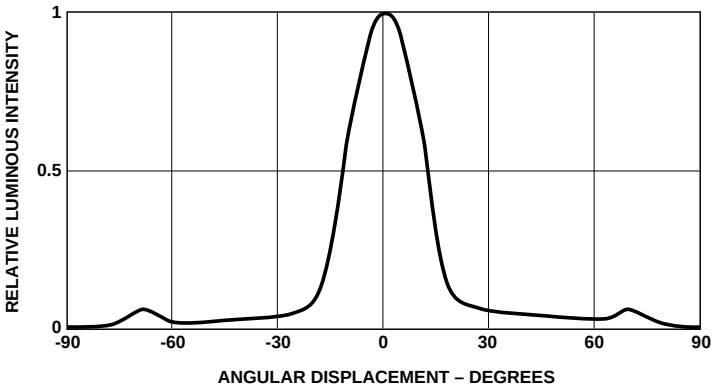


Figure 6b. CW2x spatial radiation pattern.

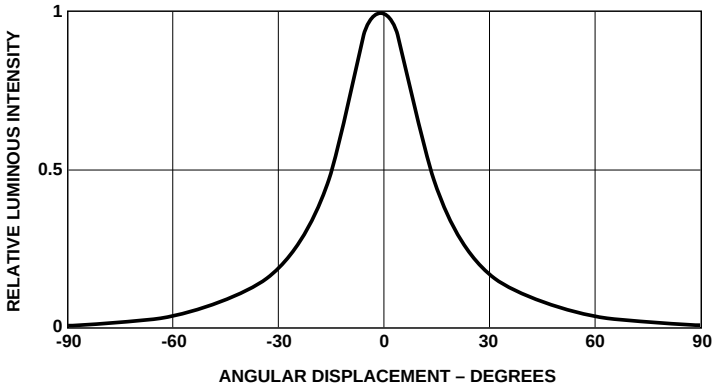


Figure 6c. CW3x spatial radiation pattern.

Intensity Bin Limits (mcd at 20 mA)

Bin	Min.	Max.
M	520	680
N	680	880
P	880	1150
Q	1150	1500
R	1500	1900
S	1900	2500
T	2500	3200
U	3200	4200
V	4200	5500
W	5500	7200
X	7200	9300
Y	9300	12000
Z	12000	16000

Tolerance for each bin limit is ± 15%.

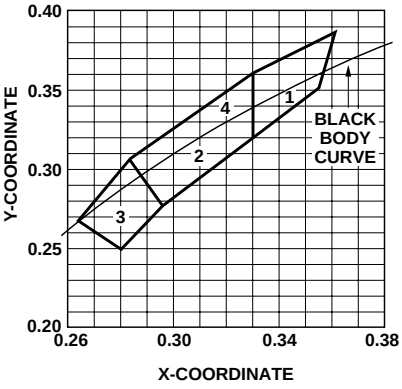
Color Bin Limit Table

Rank	Limits (Chromaticity Coordinates)				
1	x	0.330	0.330	0.356	0.361
	y	0.360	0.318	0.351	0.385
2	x	0.287	0.296	0.330	0.330
	y	0.295	0.276	0.318	0.339
3	x	0.264	0.280	0.296	0.283
	y	0.267	0.248	0.276	0.305
4	x	0.283	0.287	0.330	0.330
	y	0.305	0.295	0.339	0.360

Tolerance for each bin limit is ± 0.01.

Note:
Bin categories are established for classification of products. Products may not be available in all bin categories. Please contact your Agilent representative for information on currently available bins.

Color Bin Limits with Respect to CIE 1931 Chromaticity Diagram



Precautions

Lead Forming

- The leads of an LED lamp may be preformed or cut to length prior to insertion and soldering into PC board.
- If lead forming is required before soldering, care must be taken to avoid any excessive mechanical stress induced to LED package. Otherwise, cut the leads of LED to length after soldering process at room temperature. The solder joint formed will absorb the mechanical stress of the lead cutting from traveling to the LED chip die attach and wirebond.
- It is recommended that tooling made to precisely form and cut the leads to length rather than rely upon hand operation.

Soldering Conditions

- Care must be taken during PCB assembly and soldering process to prevent damage to LED component.
- The closest LED is allowed to solder on board is 1.59 mm below the body (encapsulant epoxy) for those parts without standoff.
- Recommended soldering conditions:

	Wave Soldering	Manual Solder Dipping
Pre-heat Temperature	105 °C Max.	–
Pre-heat Time	30 sec Max.	–
Peak Temperature	250 °C Max.	260 °C Max.
Dwell Time	3 sec Max.	5 sec Max.

- Wave soldering parameter must be set and maintained according to recommended temperature and dwell time in the solder wave. Customer is advised to periodically check on the soldering profile to ensure the soldering profile used is always conforming to recommended soldering condition.
- If necessary, use fixture to hold the LED component in proper orientation with respect to the PCB during soldering process.
- Proper handling is imperative to avoid excessive thermal stresses to LED components when heated. Therefore, the soldered PCB must be allowed to cool to room temperature, 25° C, before handling.
- Special attention must be given to board fabrication, solder masking, surface plating and lead holes size and component orientation to assure solderability.
- Recommended PC board plated through hole sizes for LED component leads:

LED Component Lead Size	Diagonal	Plated Through Hole Diameter
0.457 x 0.457 mm (0.018 x 0.018 inch)	0.646 mm (0.025 inch)	0.976 to 1.078 mm (0.038 to 0.042 inch)
0.508 x 0.508 mm (0.020 x 0.020 inch)	0.718 mm (0.028 inch)	1.049 to 1.150 mm (0.041 to 0.045 inch)

Note: Refer to application note AN1027 for more information on soldering LED components.

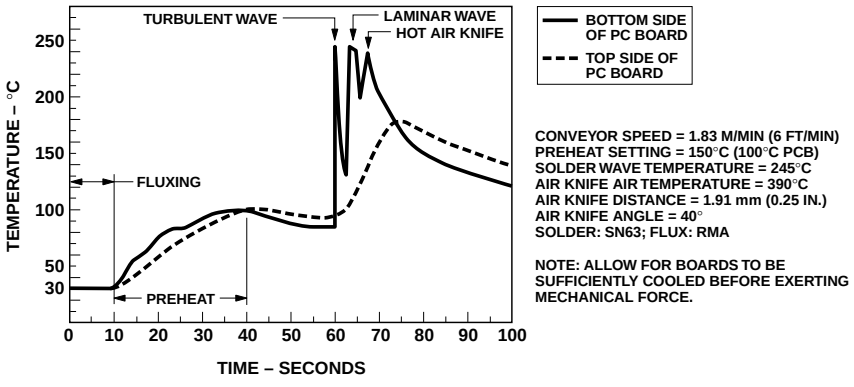


Figure 7. Recommended wave soldering profile.

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Data subject to change.

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